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The International Station Meteorological Climate Summary (ISMCS) is a Compact Disc-Read Only Memory (CD-ROM) containing climatic records for 640 primary weather-observation sites and over 5800 secondary sites around the world. When used with a personal computer (PC) equipped with a CD-ROM drive, the ISMCS provides convenient access to the equivalent of 250,000 pages of climatic tables. The ISMCS was developed at the Federal Climate Complex in Asheville, North Carolina, as part of an ongoing effort to distribute the massive climatic database maintained there. Although the access software included on the ISMCS is written for a DOS PC, methods to access the ISMCS data files from UNIX computers are being developed.

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Cover: Using ISMCS access software on the CD-ROM, a user can find a weather station of interest by drawing a box around a map area, which is then zoomed to show the stations available within the box. The user specifies which station data is to be retrieved by entering the station number, call sign, name, or other key. Please see article by T. Jarrett, page 1578.

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The International Station Meteorological Climate Summary CD-ROM

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The International Station Meteorological Climate Summary CD-ROM

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Abstract

The International Station Meteorological Climate Summary (ISMCS) is a Compact Disc-Read Only Memory (CD-ROM) containing climatic records for 640 primary weather-observation sites and over 5800 secondary sites around the world. When used with a personal computer (PC) equipped with a CD-ROM drive, the ISMCS provides convenient access to the equivalent of 250 000 pages of climatic tables. The ISMCS was developed at the Federal Climate Complex in Asheville, North Carolina, as part of an ongoing effort to distribute the massive climatic database maintained there. Although the access software included on the ISMCS is written for a DOS PC, methods to access the ISMCS data files from UNIX computers are being developed.

1. Introduction

The International Station Meteorological Climate Summary (ISMCS) Compact Disc-Read Only Memory (CD-ROM) was developed at the Federal Climate Complex in Asheville, North Carolina, as a joint U.S. Navy, U.S. Air Force, and Department of Commerce project. The Federal Climate Complex includes the Naval Oceanography Command Detachment (NOCD) Asheville, the Air Force Environmental Technical Applications Center Operating Location-A, and the National Climatic Data Center.

The ISMCS contains climatic records for 640 primary weather-observation sites and over 5800 secondary sites around the world. The ISMCS data are digitized copies of the tables contained in various climatologies, including the Air Force Surface Observation Climatic Summaries, the Navy World-Wide Airfield Summaries, and the Navy Summaries of Meteorological Observations, Surface. These summaries are monthly and annual tabulations of temperature, precipitation, wind, clouds, pressure, and psychrometric data. The single ISMCS CD-ROM disc replaces 250 000 pages of printed text. The applicability of CD-ROM to such large datasets was described by Mass et al. (1987).

The ISMCS CD-ROM project grew out of the production of floppy-disk versions of the above summaries. One 360K disk was required for each station. As

the number of supported stations and disks grew, it became clear that CD-ROM was a more appropriate distribution medium. Using data-compaction methods, about 1.5 GB of ASCII character data were compressed into 220 MB of CD-ROM storage.

2. ISMCS operation

Like most CD-ROMs, the ISMCS was designed for computers that run DOS. The ISMCS host computer system requirements are:

- IBM-compatible PC with at least 400kB RAM,
- EGA graphics or higher,
- DOS 3.0 or higher, with DOS CD-ROM extensions,
- CD-ROM drive, and
- Hard- or floppy-disk drive.

The ISMCS access software is included on the CD-ROM. The software is menu driven and incorporates "help" screens, accessible via a function key. To help find a station of interest, the user can draw a box around a map area (see cover figure), which then is zoomed to show the stations available within the box (Fig. 1). The desired station is specified by entering the World Meteorological Organization station number; the weather bureau, air force, and navy station number; station name; country; latitude and longitude; elevation; or call sign (Fig. 2). The user selects the data-table type from a menu. The retrieved table is displayed on the computer monitor and can be saved as an ASCII file for printing or use by another application program. A user-defined list of commonly accessed stations can be saved to quicken later retrievals.

ISMCS was distributed to over 200 navy and marine corps activities worldwide and provided climatic support during Desert Storm, the 1991 war with Iraq. Correspondence received from these users conveyed a favorable response, noting that ISMCS was often their primary source of climatic data. User complaints have noted the excessive time the startup logos remain on the computer screen and the blockiness of the map graphics when zoomed.

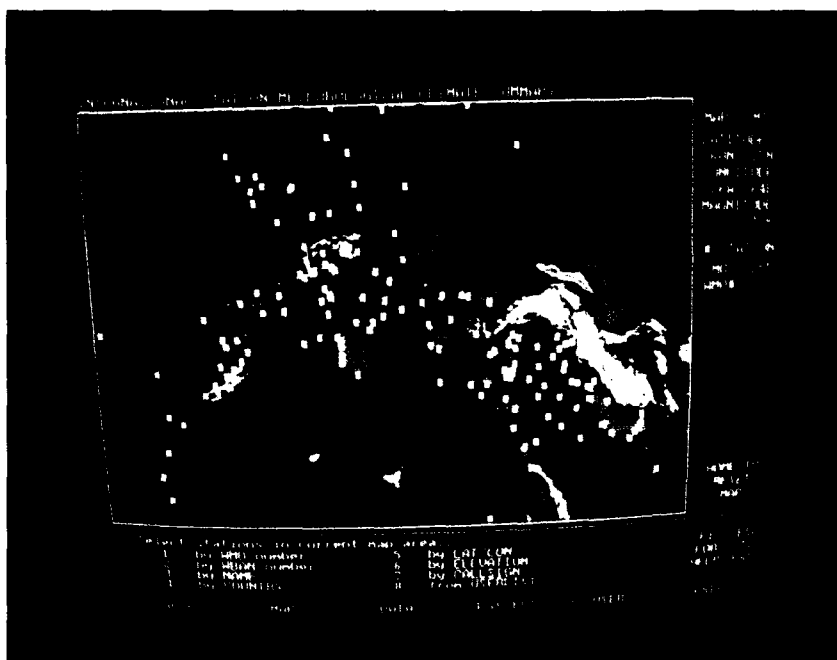


FIG. 1. The user-defined area of interest is overlaid with the locations of stations with data. ISMCS then prompts the user to select a station through one of eight methods.

3. CD-ROM and UNIX

The results of a survey conducted by *CD-ROM EndUser* magazine in August 1990 showed that CD-ROM is used with DOS by 75% of all CD-ROM users. UNIX was used by less than 1% of the respondents. However, the number of UNIX computers equipped with CD-ROM drives has grown rapidly in the subsequent two years. Some vendors of UNIX computers now distribute system software exclusively on CD-ROM. The navy will use nearly equal numbers of DOS and UNIX computers (about 65 of each) to provide operational climatic support. Thus, it is desirable to use the ISMCS with both operating systems.

The ISMCS conforms to the International Standards Organization (ISO) 9660 format, which standardizes the logical format of CD-ROM directories and files. Although every ISO-standard CD-ROM drive can read every ISO-standard CD-ROM disk, achieving operating system

interoperability remains problematic. For example, DOS file names must be eight characters or less and file names are restricted to certain characters. There are also restrictions on the depth of directories. Because ISO 9660 provides insufficient support for UNIX file systems, extensions to this standard have been proposed. These proposals include the System Use Sharing Protocol and the Rock Ridge Interchange Protocol. Until these protocols are approved and implemented, however, it will be necessary to develop additional UNIX software to access DOS CD-ROMs such as the ISMCS.

The Naval Research Laboratory (NRL), Marine Meteorology Division, is developing the necessary software to allow a UNIX computer to access the ISMCS. A UNIX-compatible CD-

ROM subsystem is mounted as a local disk, which allows navigation of the CD-ROM directories and files just as if they are located on a hard disk. The first problem encountered in developing this capability was that all ISMCS file names included the characters ";1"

STATION	NAME	CALL	NAME	ST	CD	LAT	LON	ELEV	TYPE
063940	0000	0000	0000	00	00	51 57N	4 25E	13 000	
023000	0001	0001	0001	00	00	31 32N	25 11E	20 000	
005150	0002	0002	0002	00	00	36 50N	25 10W	320 000	
007300	0003	0003	0003	00	00	34 43N	10 11E	75 000	
000000	0004	0004	0004	00	00	29 32N	52 35E	690 000	
000000	0005	0005	0005	00	00	37 29N	14 55E	72 000	
000000	0006	0006	0006	00	00	33 32N	16 10E	61 000	
000000	0007	0007	0007	00	00	59 39N	17 57E	200 000	
000000	0008	0008	0008	00	00	38 58N	46 17E	230 000	
000000	0009	0009	0009	00	00	29 28N	36 30E	230 000	
000000	0010	0010	0010	00	00	35 40N	5 54E	65 000	
000000	0011	0011	0011	00	00	34 13N	4 00E	1673 000	
000000	0012	0012	0012	00	00	35 41N	51 12E	300 000	
000000	0013	0013	0013	00	00	40 13N	22 50E	13 000	
000000	0014	0014	0014	00	00	50 49N	6 55W	13 000	

FIG. 2. The user specifies which station data is to be retrieved by entering the station number, call sign, name, or other key.

as a suffix after the extension. This suffix represents the version number of the DOS file but creates an illegal UNIX file name. The CD-ROM subsystem software, which translates the ISO 9660 format to a UNIX-compatible format, was modified to suppress the suffix and allow file access. The ASCII characters in the ISMCS files can be displayed by the UNIX "strings" command, but the numerical climatic data are stored in a packed binary format. The ISMCS includes DOS object code for unpacking these data, but these compiled programs are unusable with UNIX computers. The source code is written in the C programming language, however, and NRL is converting these programs to run with UNIX. The ISMCS graphical interface also must be replaced during this conversion. Although the ISMCS is self-contained for DOS use, the UNIX version of the access software must be stored on magnetic disk separately from the ISMCS data files on the CD-ROM. Using the above approach, the U.S. Navy will have the capability to use a single version of the ISMCS on both DOS and UNIX computers. Mass (1990) notes a similar effort at the University of Washington to use a DOS CD-ROM on a UNIX Sun workstation.

4. Additional developments

The ISMCS is the Naval Oceanography Command's first step toward replacing the hundreds of bulky hard-copy climatic publications now in use with CD-ROM. An upgrade to the ISMCS is scheduled during 1992 and will add data for 240 stations, include mouse support, and expand the graphic capabilities. NOCD Asheville plans to publish seven other CD-ROMs containing climatic data during this decade, including a marine atlas of the world, an upper-air atlas, a tropical and extratropical cyclone atlas, and an ice atlas. Other naval applications of CD-ROM and optical disc technologies include the Cooperative Program for Operational Meteorology, Education and Training (COMET) and the computerization of the Navy Tactical Applications Guides (NTAG).

COMET is a program of the University Corporation for Atmospheric Research sponsored by the National Weather Service, with support from the Naval Oceanography Command, the Air Force Air Weather Service, and the Army Test and Evaluation Command, Atmospheric Science Division. COMET is developing computer-based learning modules as forecaster-train-

ing aids. The COMET computer system connects a DOS PC to an analog optical-disc player, which supports audio and full-motion video. The first two COMET modules deal with Doppler radar interpretation and the initiation of convection.

The NTAG publications document case studies of meteorological and oceanographic phenomena with high-resolution satellite imagery. The ten published NTAGs support training and are used as references for satellite-image interpretation. The printed NTAG text and images are being transferred to CD-ROM so that computer software can expedite the retrieval of case studies of interest to the user.

5. ISMCS product availability

Copies of the ISMCS are available free of charge to U.S. Navy and Marine Corps activities by contacting the Officer in Charge, NOCD, Federal Building, Asheville, NC 28801 (tel.: 704-252-7856). U.S. Air Force activities can obtain the ISMCS free from the Air Weather Service Technical Library, Scott AFB, IL 62226 (tel.: 618-256-2625). Others can purchase the ISMCS for \$50 from the National Climatic Data Center, Customer Services, Federal Building, Asheville, NC 28801-2696 (tel.: 704-259-0682).

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